Final Report

Learning Evaluation of Strengthening Equity through Applied Research Capacity building in eHealth (SEARCH)

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The evaluation of the SEARCH program was implemented by Josef Decosas of **hera** and Lawrence Mbuagbaw of McMaster University.

Over a period of two years, the SEARCH research teams and IDRC staff participated in discussions, interviews and on-line surveys to provide data for the evaluation. We are grateful for their active participation which made this evaluation possible.

ABBREVIATIONS

AUB	American University of Beirut
CRSN	Centre de Recherche en Santé de Nouna (Burkina Faso)
eHealth	Health care practice supported by electronic processes
GEHS	Governance for Equity in Health Systems (former IDRC program area)
Icddr,b	International Center for Diarrhoeal Disease Research, Bangladesh
ICT	Information and Communication Technology
IT	Information Technology
ITR	Interim Technical Report
KEMRI-Wellcome	Kenya Medical Research Institute – Wellcome Trust
LMIC	Low and Middle Income Countries
mHealth	Health care practice supported by mobile phone technology
MNCH	Maternal, Neonatal and Child Health
PHAD	Institute of Population, Health and Development (Viet Nam)
PI	Principal Investigator
RQ+	Research Quality Plus (an IDRC instrument)
SEARCH	Strengthening Equity through Applied Research Capacity building
SZHD	Sidama Zone Health Department (Ethiopia)
UPCH	Universidad Peruana Cayetano Heredia

EXECUTIVE SUMMARY

The learning evaluation accompanied the implementation of the research projects funded under the SEARCH program for a period of two years to generate lessons about what can be achieved by networking among the research teams. It was launched at the first SEARCH program workshop in October 2014. It was expected to answer five evaluation questions about the implementation of central concepts derived from the principles of the former IDRC GEHS program under which SEARCH was funded; about the integration of social and gender analysis; about the implementation of knowledge translation strategies; about the projects' approach to research quality; and about cross-grant learning and networking within the program.

The evaluation focused on the program level, i.e. on the portfolio of projects and the outcomes achieved through interactions and interchanges among them. It applied an open-ended realist evaluation methodology documenting evolving knowledge rather than measuring the achievement of predefined results. Data were collected through document reviews, two on-line surveys, and three rounds of key informant interviews. The main analytical methods employed were content and social network analyses. The evaluation findings are presented under the headings of the five evaluation questions.

A draft evaluation report was presented to the SEARCH teams at the second workshop on November 14th in Vancouver. Comments received were taken into consideration in the report.

Integration of central concepts: During the evaluation period some evolution of the understanding of the central concepts of governance, equity and systems integration was observed. This was especially pronounced for the concept of equity, greatly enhanced by a consultancy to strengthen gender analysis organised by IDRC. The focus on gender equality was strengthened in the implementation of several projects. The concepts of governance and systems integration, however, remained to be only vaguely defined with different projects continuing to interpret them in different ways.

Social and gender analysis: Social analysis during project development provided information for the selection of the research area and population, but it was not an important subject of study during project implementation with few exceptions. Gender analysis, however, was strengthened considerably following the consultant support organized by IDRC, including among the teams who, at the time of the baseline interviews, had expressed confidence in their capacity to integrate gender equality issues in their studies.

Knowledge translation: During the period of the evaluation, the implementation of knowledge translation initiatives among the research projects became increasingly more evident. At the time of the final round of interviews each team had engaged one or more stakeholders. Some teams received external support for their knowledge translation strategy. There was no evidence that approaches to knowledge translation were shared within the SEARCH network or that any team received support from a network partner.

Research quality: All of the interviewed researchers confirmed the key role of IDRC project staff in improving the quality of the research. Interactions with other SEARCH teams at the first program workshop were also mentioned by many. Subsequent networking, however, did not provide much addition. The research outputs available at the time of the evaluation did not provide a sufficient basis for an assessment of research quality in the SEARCH program.

Cross-grant learning: The expectations for cross-project learning beyond the traditional mode of IDRC mediated exchanges and organized workshops were only partially realized. The main reason included the diversity of projects within the SEARCH program. Active networking was observed

between projects that were thematically closer aligned, as for instance the projects in Bangladesh and in Kenya.

The evaluation identified four lessons to be learned from the implementation of the SEARCH program:

Lesson 1: The research field circumscribed by the objective of the SEARCH program (eHealth, health systems, and equity) is very large. For a relatively small research program such as SEARCH, a more narrowly defined research area may have a greater chance of generating a critical level of results at the program level with a potential of greater impact.

Lesson 2: Research teams in the SEARCH program had a lot of interest and capacity to further develop and implement the principles of equity, governance and systems integration that framed the SEARCH program. However, unless there is a specific effort to support this process, as for the consultant support in gender research, this interest is marginalized and the capacity remains underutilized.

Lesson 3: The SEARCH program confirmed in a convincing manner that the IDRC grants-plus approach contributes significantly to IDRC's success in its global role as a funder of research development in low and and middle-income countries.

Lesson 4: The SEARCH program united seven research teams working in the relatively new field of the interface of ICT and health systems. Stimulating networking in this field is important, but it is also more difficult than networking in other research areas that have standardized methodologies and approaches. This requires resources that were not foreseen in the development of the SEARCH program. The level of networking and the results of network exchanges did therefore not live up to expectations.

The five recommendations of the evaluation are based on the lessons learned. Briefly summarised they are:

Recommendation 1: IDRC should continue to support research on the interface of eHealth with health systems focusing particularly on the equity of health services.

Recommendation 2: Future initiatives in this area by IDRC should attempt to define a more focused research area in order to increase the potential for the development of a critical level of research initiatives and institutions that will generate an impact on health systems structures and practices.

Recommendation 3: Any future program should establish a process to support a continuous dialogue on central guiding principles and concepts in order to link them more firmly to project implementation.

Recommendation 4: The IDRC grants-plus approach is a key factor in the quality of funded research. It is a distinguishing mark of IDRC research development funding that should not be weakened.

Recommendation 5: Stimulating the emergence of research networks for mutual support and greater impact in new research areas is an important and worthwhile effort. However, it should be adequately resourced, including the provision of resources for more frequent physical meetings, a well adapted distance networking platform, and possibly also by funding an organization to act as network convener and animator.

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1 THE SEARCH PROGRAM

The Strengthening Equity through Applied Research Capacity building in eHealth (SEARCH) program was launched in March 2011. The expected outcomes of the program were:

- Greater understanding and awareness of health systems research considerations and approaches in eHealth research
- Generation of evidence that examines how and when health systems are equitably strengthened in terms of use of eHealth
- Research capacities of LMIC-based researchers are strengthened in the understanding of the use of eHealth for equitable health systems
- Researchers in SEARCH share with and learn from one another, as well as from others in the relevant research communities, to enrich the collective knowledge that is produced
- New and existing research and evaluation frameworks are developed or refined so that they can be used to analyze eHealth using a health systems perspective
- Policy dialogues at local, national and global levels are informed by evidence generated from selected grants

Seven research grants were awarded under the SEARCH program. Six of them started between July and September of 2013 and the seventh in May 2014.

Table 1: SEARCH projects

Country	Research Partner	Duration	Research Objectives
Bangladesh	Icddr,b	8/13 – 8/16	Developing a framework to examine how eHealth can influence equity and accountability in health
Burkina Faso	CRSN	9/13 – 9/16	Examining how extending health services via mHealth can improve the health of pregnant women, children, and people living with HIV
Ethiopia	SZHD	5/14 – 5/17	Researching how health extension workers can use eHealth to strengthen delivery of health services and improve governance and health system integration of the existing health management information system
Kenya	KEMRI-Wellcome	9/13 – 9/16	Developing a framework to examine how the use of eHealth is influencing health equity in Kenya, as well as its potential to strengthen health systems governance
Lebanon	AUB	7/13 – 7/16	Implementing and evaluating integrated interventions at the primary health care level to address the burden of chronic diseases
Peru	UPCH	8/13 – 8/16	Examining the role of eHealth in strengthening MNCH through improving data quality and use of data for primary health care decision-making
Viet Nam	PHAD	8/13 – 8/16	Researching how mHealth, integrated with the existing health information system, can influence access to MNCH services for ethnic minority women

2 THE LEARNING EVALUATION

The learning evaluation was implemented by **hera**. It accompanied the implementation of the research projects to generate lessons about what can be achieved by networking among the research teams. It was launched at the first SEARCH program workshop in October 2014 in Cape Town.

The evaluation was expected to answer the following five questions:

1. How are central concepts (i.e. health equity, governance, systems integration) being defined, integrated in the implementation, and used in the analysis in each of the SEARCH projects?
2. What strategies and related implementation plans are successful or unsuccessful (and why) with respect to integrating sound social and gender analysis?
3. Which research and knowledge translation strategies and practices have been successful or unsuccessful (and why) in influencing policies, practices, research agendas and/or funding priorities?
4. How is 'research quality' perceived, pursued and measured within and across the projects?
5. How have the cross-grant learning interactions (formal and informal) within SEARCH influenced project outcomes (positive, negative, intended and unintended)?

An interim evaluation report was prepared and submitted to IDRC in October 2015. It was posted for discussion on the SEARCH SharePoint site. The focus of this report was on the analysis of networking among SEARCH program partners and on the evolution of the way research teams interpreted and addressed the key concepts of the former IDRC Governance for Equity in Health Systems (GEHS) program under which SEARCH was funded: Governance, equity and systems integration. A draft version of the final report was presented and discussed at the second SEARCH program workshop in November 2016 in Vancouver.

3 METHODOLOGY

The methodological approach, as outlined in the inception report, was that of a realist evaluation, employing a number of open-ended evaluation methods that focused on documenting evolving knowledge rather than on the achievement of predefined results. The theoretical frame of context, mechanism and expected outcome [Pawson & Tilley 2004] was outlined in the inception report and can be summarized as follows:

- **Context:** A rapid increase in initiatives for the introduction of ICT in primary care and in health information systems in seven low- and middle-income countries on three continents.
- **Mechanism:** A networked portfolio of seven health systems research projects that (a) piloted eHealth applications to increase the coverage and reach of primary health care services, (b) researched models for integrating eHealth into the health systems building blocks of governance and health information, or (c) combined these two objectives with differing levels of emphasis.
- **Expected outcome:** A contribution to research capacity, sharing of knowledge, innovative research methods and policy influence in the general field of eHealth applications in health systems with a focus on equity, governance and systems integration.

This frame identified the program as the subject of the evaluation; i.e. the portfolio of projects and the outcomes achieved through interactions and interchanges among them. The evaluation itself was meant to take an active role in facilitating and stimulating these interactions.

Data were collected through document reviews, primarily of interim technical reports and early research outputs, two on-line surveys, and three rounds of key informant interviews. The main analytical methods employed were content and social network analyses.

The table summarizes the activities that were implemented in the context of the evaluation.

Table 2: Learning evaluation activities

Activity	Date	Purpose
First SEARCH program workshop	Oct. 2014	To introduce the learning evaluation to the research teams and agree on modalities and contents of networking activities

Activity	Date	Purpose
First on-line survey of research teams	Jan – Feb 2015	To explore issues and themes that would benefit from networking and joint learning by SEARCH teams and by IDRC and to establish a baseline against which changes that occurred during program implementation could be assessed
First round of interviews	Jan – April 2015	Semi-structured telephone interviews with research team members to deepen and contextualize the information collected in the survey
Launching of SEARCH SharePoint site	Feb 2015	To create an interactive internet platform for information exchanges and networking in SEARCH
Second round of interviews and social network analysis	Sep 2015	To explore networking activities, outcomes and experiences during the period from January to July 2015 and perform a social network analysis
Content analysis of Technical Reports and SharePoint entries	Sep 2015	To extract and analyze content of Interim Technical Reports (ITRs) submitted by the research teams that was relevant to networking and inter-project exchange activities and of items posted on the SharePoint site
Third round of interviews and social network analysis	Jun/Jul 2016	To explore progress in networking activities among SEARCH teams, update information on the evolution of views on SEARCH concepts and their integration in the research, and collect the views of project teams about expected outcomes and metrics for success
Follow-up on-line survey	Aug/Sep 2016	To assess any changes in the way the SEARCH program principles were understood and applied against the baseline assessment in January 2015
Content analysis of Technical Reports and SharePoint entries	Sep 2016	To review ITRs, early research outputs, and the content of network activities (including the gender training) against the expected outcomes of the SEARCH program
Final SEARCH program workshop	Nov 2016	Presentation and discussion of the draft evaluation report

Interim technical reports were generally submitted at regular intervals determined in the grant agreement. At the time of analysis, 29 reports were available:

Table 3: Available Interim Technical Reports (last month of period covered)

Country	ITR 1	ITR 2	ITR 3	ITR 4	ITR 5
Bangladesh	Jan 2014	Jul 2014	Jan 2015	Jul 2015	Jan 2016
Burkina Faso	Feb 2014	Aug 2014	Feb 2015	Aug 2015	Feb 2016
Ethiopia	Oct 2015	undated	---	---	---
Kenya	Mar 2014	Sep 2014	---	Sep 2015	Mar 2016
Lebanon	Jan 2014	Jul 2014	Jul 2015	Jul 2016	---
Peru	Feb 2014	Aug 2014	Feb 2015	Aug 2015	---
Viet Nam	Jan 2014	Jul 2014	Jan 2015	Jul 2015	Jan 2016

Four of the seven research teams also provided documentation of early research outputs, primarily abstracts and posters presented at international conferences, and one team provided the report of a final project evaluation. The other three teams did not respond to the request to provide preliminary research outputs although several are listed in the interim technical reports. A list of outputs that were received by the evaluation team is provided in Annex 1.

The responses to the two on-line surveys were analyzed by comparing narrative responses and mean scores on Likert scales to identical questions asked in 2015 and 2016. The interview responses were summarized in an Excel database allowing a comparison of responses between projects and between the two interview rounds. The main results are presented in Annex 3.

The social network analysis assessed the patterns, types and intensity of exchanges among researchers throughout the period of the SEARCH learning evaluation (January 2015 - Jun 2016). Data were collected by telephone interview for the period from January 2015 to July 2015 and by questionnaire for the period from to August 2015 to June 2016. Data from both time periods were merged to create a picture of networking that occurred during the SEARCH program. For both time periods, respondents from each SEARCH team were asked to provide the following information:

- Between January 2015 and the end of June 2015 (or August 2015 to end of June 2016) how many exchanges have you had with people in the network, including the SharePoint site?
- Who initiated the exchange?
- What was the mode of this exchange? (phone call, email, face-to-face)
- What was the subject of discussion?
- On a scale of 1 to 7, how useful was it?
- What changed as a result of this exchange?
- Which exchanges did you not have that you would have liked to have?
- Why did you not have them?

In the network analysis, we only included exchanges between the seven SEARCH teams and between the teams and the SharePoint networking hub. There were, for obvious reasons, many more exchanges with IDRC. Communications on administrative issues could not be separated from technical exchanges in line with the IDRC grants plus approach. They were not considered in the analysis as they are common practice by IDRC for all IDRC projects. Exchanges with the evaluation team were also not considered as they served only for the purpose of data collection for the evaluation.

The data were summarized as counts and percentages or means and medians were appropriate. The number, mode, usefulness of exchanges and network graph were presented as figures or tables, while the rest of the findings were reported narratively. The actors in the network were analyzed according to the following metrics: Degree of centrality (the total number of connections/exchanges for each actor), betweenness centrality (whether actors serve as bridges in the shortest paths between two actors); closeness centrality (how close one actor is to other actors on average - a measure of social power of the actor) and closeness (the degree to which an actor is near all other actors). [Grunspan et al. 2014] Analyses were conducted using NodeXL Excel Template Version 1.0.1. 342; Social Media Research Foundation. [Smith et al. 2009]. The finding of the network analysis, including a glossary of terms, are presented in Annex 2.

Finally, an expert team was engaged by IDRC to strengthen gender analyses and gender equality programming in all projects. The team had many exchanges with the SEARCH teams including two webinars, each one with a sub-set of project teams. These were also not included in the analysis. Although the webinars allowed limited cross-project interactions, the main modality of exchanges were bilateral communications between the consultants and individual research teams.

3.1 Methodological limitations

Each project had its own reality of context, mechanism and expected outcome. The diversity of these realities, the wide geographic spread, the language barriers, and the global context of hundreds of pilot and research initiatives in eHealth and mHealth proved to be major challenges in achieving a critical level of productive interactions among the SEARCH teams that could generate evaluable outcomes. In Kenya alone, a mapping exercise of eHealth projects undertaken by the SEARCH team

identified 88 eHealth projects of which 70 were active, the remaining having closed after funding of a pilot intervention ended. Among the active projects, the majority (69%) were mHealth initiatives, using mobile phone technology, primarily for client education, data collection or provider training.

Outcome mapping to answer the question of how cross-grant learning interactions influenced research quality and project outcomes was attempted, but it was not fruitful because of the limited number of these interactions. In interviews, most research teams stated that cross-team interactions were few and of limited usefulness. Exceptions were the exchanges during the first SEARCH workshop in Cape Town which were rated highly, and exchanges between the two research teams in Kenya and Bangladesh that engaged in an active dialogue on methodologies and approaches.

Social network analysis to assess the intensity and pattern of cross-project exchanges had to rely solely on self-reported data. We had anticipated to use the network statistics of the SharePoint site as a main data source for analysis. These network statistics were, however, not available according to the IDRC IT team. The number of researchers and project staff who had access to this site varied among the projects from one to ten. The questionnaire about networking activities, however, was completed by one delegated member of the team and may not reflect all uses of the SharePoint site.

An evaluation of research quality using the IDRC RQ+ tool was not possible at the time of the final evaluation as there were too few outputs, most of them in the form of abstracts and posters which are not suitable for evaluation with this method.

4 FINDINGS

The evaluation findings are structured in the sequence of the evaluation questions. In addition, we added a section summarizing the projects outcomes as assessed by the Principal Investigators or Co-Principal Investigators at the time of the final interview round.

4.1 Integration of central concepts

How are central concepts (i.e. health equity, governance, systems integration) being defined, integrated in the implementation, and used in the analysis in each of the SEARCH projects?

There were differences in the profile of on-line survey participants between the baseline and the follow-up survey (see Annex 3). IN general, however, there was a high level of agreement with statements about the impact of the introduction of ICT in health systems on equity, governance and systems integration. The level of agreement with statements about the effect of their own research on increasing the equity of services, strengthening governance and promoting systems integration was equally high. Differences in agreement ratings between baseline and follow-up should not be over-interpreted in view of differences in the respondent profile between the two surveys. Remarkable, however, were the differences in the narrative responses to questions on how the research would achieve these effects. In the follow-up survey, the answers were considerably longer and more detailed, indicating that the reflection about these central concepts had matured during implementation of the research studies.

Table 4: Average agreement scores on 5-point Likert scales to three questions

Survey questions (3 questions averaged in each row)	Baseline	Follow-up
ICT can lead to greater equity, better governance and systems integration	1.42	1.32
The findings of our research will contribute to this impact of ICT	1.18	1.40

(from -2=strongly disagree to +2=strongly agree)

This effect was also evident in the follow-up interviews. The interviewed PIs and research staff generally stated that the three core principles were already addressed in the original research design. This is not surprising as this was, among others, a prerequisite for the award of the research grant. Nevertheless, they acknowledged an evolution of conceptualisation and translation of these concepts in the implementation of their studies. Table 5 presents some examples

Table 5: Statements on the evolution of key concepts in follow-up interviews

Concept	Sample Statements
Equity	• We started to examine the issue of mobile phone ownership among women and now have a plan for a gender equity analysis. • During screening for diabetes and hypertension, we found that some people could not afford the cost of the screening tests. We negotiated with government services to achieve discounts for people in financial need. • Cell phone messages were well accepted and appreciated, but we found that when working with ethnic minority groups we will need to add a voice messaging system because of the high level of illiteracy.
Governance	• Governance issues arose during the development of the accountability framework. We introduced indicators for transparency, rule of law, and performance evaluation. • Weak community participation in the governance of health facilities was an issue. We worked on strengthening community committees to take part in decision making. • Innovators who are introducing ICT in health were sensitized by the project to consider governance issues, and especially community participation in governance. • Our research focused on public health facilities and the tools and findings were relatively easy to implement because decision-making is centralised. But we also encountered many privately-owned facilities and this required some maneuvering.
Systems Integration	• Initially we defined this concept in terms of the integration of electronic systems. But during implementation of the project we developed a more holistic health systems approach to the issue of integration. • Our understanding of systems integration was enhanced by broadening our initial focus on specific diseases towards a more comprehensive approach to health services along a continuum of care.

The concept of equity was considered central by the interviewed PIs and research staff. It was widely interpreted in terms of equity in access to health services and information across social, economic, ethnic, geographic and gender divides. Gender equality received additional attention at the level of the supply side of health services, for instance by considering the effect of eHealth on influencing the role and recognition of female health workers. This was enhanced by the consultancy on gender equality initiated by IDRC.

Many projects, on the other hand, still struggled with the concept of systems integration. This was evident in the baseline and the follow-up interview rounds. Systems integration was by some interpreted to mean the integration and interoperability of IT systems. For others, it meant the integration of their own research activities in the national health system. Some viewed it as an organizing principle linking the health systems building blocks of service delivery, health workforce, health information systems, access to essential medicines, financing, and governance. While this last view is without doubt closest to IDRC's definition of the concept, there is little evidence that IDRC invested much effort in engaging project partners in a discussion of systems integration.

The review of the interim technical reports and early research outputs showed quite a mixed picture in terms of understanding and focus on the three central concepts. This was mainly due to the wide scope of research studies funded under the SEARCH program, a recurrent theme in this evaluation. As the range of projects illustrated, ICT is a tool that has many different uses and types of application in health systems. There are broadly three levels on which the SEARCH projects approached the issue of eHealth:

- exploring the use of mobile phones for health promotion and demand generation
- examining ways of improving health information systems (data collection, data analysis, and data use) using mobile phone or internet technology or both
- improving the integration of ICT in health systems governance through mapping, consensus building, and the development of guidelines, norms and standards

Two projects, in Bangladesh and in Kenya, worked exclusively at the policy and systems level. The three concepts of the SEARCH program (health equity, governance, systems integration) were central to their research objectives from the start, although they also evolved as the projects explored the national landscape of policies and initiatives.

For the other five projects, the concepts took a less central role in their research design. Clearly, all five remaining projects had a focus on equity by exploring ways to improve the equity of health services by reaching out to populations or groups with marginal access to health, for instance ethnic minority women in Viet Nam or people with chronic diseases in Syrian refugee camps in Lebanon. Some also focused on inequalities among providers, for instance on the status and working conditions of female health extension workers in Ethiopia. Known inequities in the delivery of health services were part of the initial problem statement that the projects aimed to address. Other issues, primarily gender inequality issues, emerged during implementation and were addressed. Examples are the social status of 'marraines'[1] in the communities in Burkina Faso, or mobile phone ownership by women in Ethiopia.

The primary measure of project performance and success of most of these five projects was the achievement of service delivery outcomes, for instance increased adherence to HIV treatment and completion of scheduled antenatal care in Burkina Faso. Equity was the subject of secondary analyses in most of the projects. The concepts of governance and systems integration were more peripheral and their definitions remained at times vague. Aiming to integrate their project activities in the national public health system, something which all projects worked on with varying success, came about as a strategy to ensure sustainability and adherence to good project practice. It flowed naturally from project implementation and was not specifically targeted at improving health systems governance and integration. The understanding of systems integration evolved among some projects, but others continued to define it in terms of increasing the interoperability of IT platforms and improving the information flow between components of the health information system. While this is a valid issue to address, it is somewhat different from the intentions formulated in the research proposal call. The proposal call acknowledged that systems interoperability represented *'just one part of achieving greater health systems integration'*, but it was not explicit in describing the other parts. [IDRC 2012]

4.2 Social and gender analysis

What strategies and related implementation plans are successful or unsuccessful (and why) with respect to integrating sound social and gender analysis?

Social analysis is the study of demographic profile, ethnic characteristics, social divisions, religious beliefs, cultural practices, and economic activities. This was not a major focus of any of the research conducted by the SEARCH teams. Information about the social situation of populations included in the research interventions clearly informed the targeting, with the primary focus on access and use of health services, mobile phones and internet technology. Analyses of social determinants of health in the project region were consulted in the development of the research projects, for instance a 2012 study on determinants of inequity in maternal and child health in Viet Nam. [Malqvist, Hoa & Thomsen, 2012] Social determinants of health-seeking behaviour and access to health services or to mobile phone technology were identified by some projects and became the subject of additional studies. For instance the project in Lebanon launched a study of the association between social characteristics and

[1] Female community volunteers who act as intermediaries between pregnant women and health service providers

outcomes of referrals to health facilities among persons at risk of chronic diseases that were identified during screening in the community.

Surprisingly, in the on-line survey the mean scores of agreement with statements about the importance of social and gender analyses and their role in the research projects decreased between baseline and follow-up, although the decrease may be related to a change in the profile of survey respondents.

Table 6: Agreement about social and gender analysis

Average scores on 5 point scales (-2 = strongly disagree; +2 = strongly agree)	Baseline	Follow-up
The expanded use of information and communication technology in health systems affects men and women differently	0.78	0.53
The expanded use of information and communication technology in health systems affects people in different social groups differently	1.06	0.74
Research on the use of information and communication technology in health systems must be based on a robust social and gender analysis.	1.61	1.21
We conducted a robust gender analysis allowing us to document the impact of information and communication technology on gender equality	1.11	1.00
We conducted a robust social analysis allowing us to document the effects of information and communication technology on social equity	1.17	1.16

For **gender analysis**, the situation was quite different. At mid-term, in 2015, two of the seven research teams mentioned in interviews that they had difficulties in identifying expertise to strengthen the gender analysis in their projects. IDRC therefore contracted a consultant group to work with the seven teams towards strengthening this aspect of their research. Two key findings of the consultancy were: [Morgan, Larson & George 2016]

- There was much underutilized capacity to conduct gender analysis within the SEARCH teams, and
- there was a strong interest in and recognition of the importance and relevance of incorporating gender into the SEARCH projects, but there was an implementation gap and more could be done to mainstream gender considerations in each of the projects.

The consultants worked with each team, providing recommendations on strengthening the gender analysis which were readily accepted and acted on as documented in interview responses and in interim technical reports. In all seven project interviews, the input of the gender consultancy was identified as having been useful with responses such as the following: *'It was good for our project because the consultants gave useful feedback on our framework. As a result, we have created indicators specific to gender throughout our model. We are now thinking about gender case studies to illustrate gender issues in eHealth and will create an online training module on these issues.'*

The latest set of interim technical reports included additional feedback and actions taken in response to the gender consultancy. In Ethiopia, for instance, the team linked the project to the study of a PhD candidate at the Liverpool School of Tropical Medicine who will conduct field work at the project site to understand if and how female Health Extension Workers are empowered by the introduction of mobile technology; what unintended consequences in terms of gender relationships result from the introduction of the technology; and if and how mobile phone technology makes Health Extension Workers more accountable to the health system.

4.3 Knowledge translation

Which research and knowledge translation strategies and practices have been successful or unsuccessful (and why) in influencing policies, practices, research agendas and/or funding priorities?

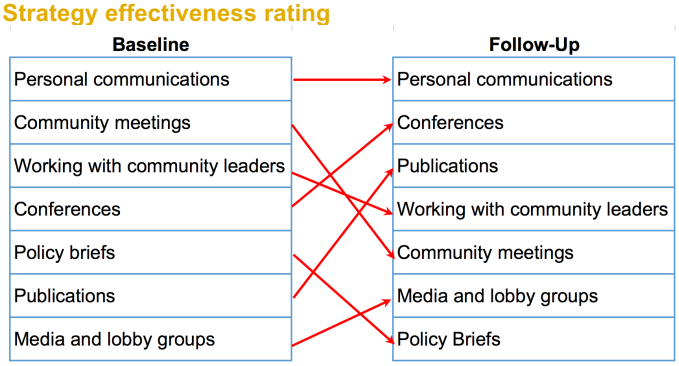
In the baseline and follow-up on-line surveys we asked three questions about knowledge translation strategies:

- A multiple-choice question to rank the relative effectiveness of different knowledge translation strategies
- A multiple-choice question to rank the knowledge translation objectives of their projects
- An open response question about the knowledge translation strategies pursued in their projects

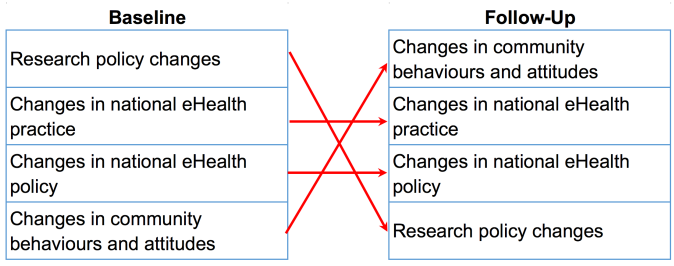
The number of responses in each survey were almost equal (between 17 and 19 for each question), but we did not control for the profile of the respondents. The responses illustrate both, a degree of consistency as well as some strategic evolution. Figure 1 shows the rankings of strategic options and objectives at baseline and at follow-up with the highest ranked strategy or objective on top.

Figure 1: Ranking of knowledge translation strategies and objectives

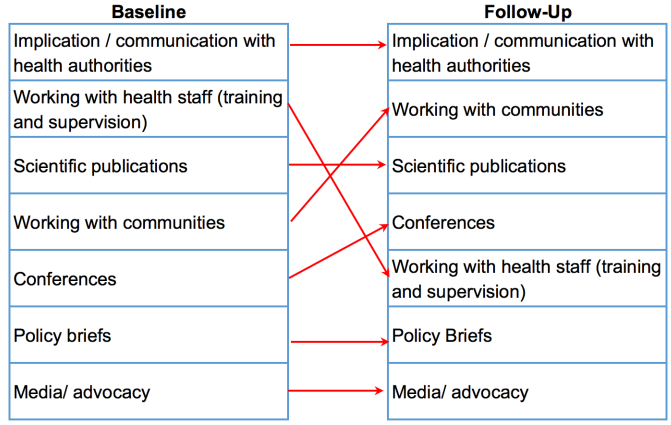
Strategy effectiveness rating



Strategy objectives



Implemented strategy



At baseline, the four knowledge translation objectives were scored almost equally important, with the objective of changing research policy on top. At follow-up, this had changed considerably. There was a wide spread in the ranking. The objective of changing community attitudes and practices scored more than twice as high as the objective to change research policy. This is also reflected in the rankings of implementation strategies: Working with communities moved into second place among the main strategies pursued by the projects. The role of scientific publications and conferences in knowledge translation was assessed to be more important at follow-up than at baseline which is also reflected in the rankings of the implemented strategy. The direct personal contact with health authorities and policy makers, including their implication in the research projects was ranked as the most effective approach to knowledge translation in both surveys, and consequently was also ranked highest among the implemented strategic options. Policy briefs and media work received very little consideration, both in terms of presumed effectiveness and in terms of implemented strategy.

This last finding was somewhat surprising and it was discussed extensively by the teams at the Vancouver workshop. Several teams underlined the overarching importance of timing, having research results ready at the time when government needs them to support a policy decision or to guide a decision process. IT issues are currently high on the political agenda of Ministries of Health which contributed to the attention paid to the SEARCH projects by Government decision-makers. But, as the team from Bangladesh pointed out, policy briefs are useful instruments that can be stored during times of low political interest and quickly re-launched when political interest rises again.

In the in-depth interviews with the seven project teams, several highlighted early results in knowledge translation, primarily referring to collaboration between the projects and the Ministry of Health. Most of these collaborations were in an early phase, but some had already generated tangible results. The research teams in Bangladesh and Kenya, for instance, had both established their role in the development of the national ICT policy in health. The linked electronic medical record and health information system developed by the research team in Peru has become a template for the reform of the national health information system. Surprisingly, none of the interviewed researchers mentioned results of knowledge translation at the community level, although these were documented in the interim technical reports and in some of the early research outputs.

Overall, the follow-up in-depth interviews revealed that the projects had made considerable progress in achieving results in knowledge translation since baseline. Each team had engaged at least one important stakeholder, some of them several stakeholders at different level. The research teams showed some flexibility in implementing their knowledge translation objectives by changing the relative importance of their strategies and targets. Some teams received external support in developing their knowledge translation strategies, but the SEARCH network had no role as a forum for information exchange and mutual support for knowledge translation.

4.4 Research quality

How is 'research quality' perceived, pursued and measured within and across the projects?

In the baseline survey, all respondents indicated that they were satisfied with the internal and external mechanisms to assure the quality of their research. The internal mechanisms cited by all respondents consisted of regular team meetings and steering committees. Some of the larger research organizations such as the icddr,b in Bangladesh and KEMRI in Kenya have a formal institutionalised external review and quality control process. All the others had an external project partner who provided support and quality control. These partners included, among others, the University of Montreal, the University of Toronto, Simon Fraser University, the Liverpool School of Tropical Medicine, and the Institute for Development Studies in the UK.

In the follow-up survey, IDRC was mentioned by several projects as a partner who contributed to assuring the quality of research through the technical support provided by program officers. At the

time of the baseline survey, the respondents declared that they would not want to change anything to strengthen the quality of their research except for some references to internal mechanisms. In the follow-up survey, however, two respondents from two different projects noted that closer collaboration among SEARCH partners would contribute to better research quality: *'better support to bring partners together on a regular basis; distributed knowledge networks work but people need to build relationships to enable working together'*. This comment, which signalled the potential role of the peer network in research quality, also included a critical note and a recommendation for what would be required to make such a network function.

The in-depth interviews validated these responses. All interviewed researchers confirmed the key role of IDRC staff in assuring the quality of the research through feedback on the interim technical reports, emails, phone calls and site visits. The interactions with other SEARCH teams at the first program workshop were also mentioned by many, however subsequent networking did not provide additional contributions to research quality.

A formal methodology or metric to measure quality was not mentioned by any of the research teams. This is a relatively new field with the recent addition of the IDRC RQ+ tool. [IDRC 2014] The application of this quality assessment instrument depends on the availability of research outputs that can be evaluated. At the time of preparing the final report, we had received two published research papers that could be clearly attributed to IDRC funding under the SEARCH program, one from Peru and one from Burkina Faso. (see Annex 1) Several additional papers were planned or already in preparation, but they were not at a stage where they could be evaluated. The two papers did not provide a sufficient basis for an assessment of research quality in the SEARCH program.

4.5 Cross-grant learning

How have the cross-grant learning interactions (formal and informal) within SEARCH influenced project outcomes (positive, negative, intended and unintended)?

IDRC had high expectations about networking and cross-grant learning among the seven SEARCH teams. The workshop of short-listed candidates during project selection and the first SEARCH workshop in October 2014 suggested that there was enthusiasm among the project teams to exchange experiences and to learn from each other. Furthermore, the fact that all seven teams were researching IT-related issues fueled the assumption that they were particularly open to and capable of using IT platforms for information exchange.

The first cautionary note to dampen these expectations was raised in the baseline survey of preferred modalities of cross-grant learning. Respondents rated workshops much higher than any of the remote communication options. It was, however, already clear that no workshops beyond the initial and final meeting were scheduled. The next setback occurred when the options for establishing a virtual networking and knowledge exchange hub were limited for budget and internal regulatory reasons to a Microsoft SharePoint site hosted by IDRC. As anticipated, the site was not popular among the teams, it was cumbersome to access and it found little use.

The outcome is illustrated in the agreement scores with statements about networking intention and practice in the baseline and follow-up on-line surveys. Although the respondents agreed that networking in SEARCH was more intense than in other research programs, their expectations about networking activities and results were largely not met as illustrated in Table 7.

Table 7: Agreement with statements about cross-grant learning

Average scores on 5 point scales (-2 = strongly disagree; +2 = strongly agree)	Baseline	Follow-up
Cross-grant learning and networking in SEARCH are more intense than in other research projects in which I have participated	0.89	0.95
I intend to engage regularly (I engaged regularly) in exchanges of information and experiences with other research teams in SEARCH	1.22	0.42
Networking with other research teams in the SEARCH program will (did) contribute significantly to the quality and success of our project	1.37	0.58
Networking with individuals, organizations and networks outside of SEARCH leads (led) to outcomes that feed back (were fed back) into SEARCH	1.37	0.68

On statements about the potential and actual usefulness of networking platforms, the SharePoint site, which had not yet been launched at the time of the baseline survey, was rated at follow-up to have been considerably less useful than anticipated as illustrated in Table 8.

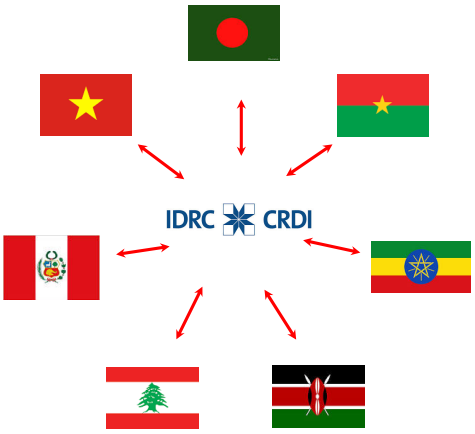
Table 8: Usefulness of networking modalities

Average scores on 5-point scales (-2 = not at all useful; +2 = very useful)	Baseline	Follow-up
The SEARCH program SharePoint site	1.33	0.58
Email or telephone exchanges with individual projects	1.21	1.33
SEARCH workshops	1.76	1.59

The repeated on-line surveys also revealed a change in the expectations of the project teams in terms of the content of networking exchanges. At baseline, 16 respondents listed 46 priority themes for information exchange. At follow-up, only 14 respondents answered this question and listed only 36 themes. The importance of themes ranked at about the same level, with issues of implementation and data analysis ranking in first place, followed by exchanges about issues of equity, governance and systems integration, and technical issues of information systems and platforms in third place. At baseline, however, the themes were described with some detail and precision. For example: 'Regulatory frameworks and policy changes in the respective countries'; 'utilisation of evidence and mechanism for engaging decision makers'; or 'advocacy strategies for integration of mHealth in the national health system'. At follow-up, the answers tended to be shorter and somewhat more perfunctory such as: 'Knowledge exchange' or 'ethical issues'. This indicates that among the research teams, the expectations on the breadth and scope of topics that would be shared among SEARCH partners had decreased over the course of the program.

The SEARCH projects did have intensive technical exchanges with IDRC, a usual practice in IDRC research grants. It is also very likely that cross-grant learning exchanges were established through these exchanges, i.e. that IDRC acted as a hub, transmitting learning from one project to another. This was, for instance, evident in the gender consultancy which, after bilateral work between the consultant team and each project, concluded with two webinars where some teams presented their approach to gender analysis to a sub-group of peers. This type of mediated networking is difficult to capture in a social network analysis. With the understanding that it does not capture the full picture, Figure 2 illustrates the 'hub and spoke' network structure established by the technical support to projects by IDRC program officers. This type of networking was certainly very active in SEARCH, but it also reflects a practice that is common to many IDRC programs.

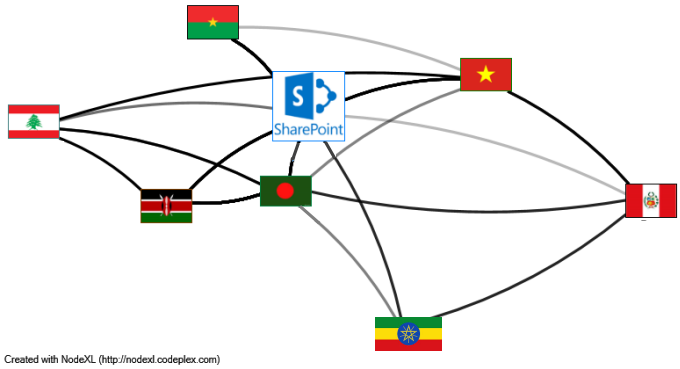
Figure 2: SEARCH network with IDRC hub



In addition, some networking contacts were established in SEARCH that resulted in exchanges between projects, either directly or via the SharePoint site. These exchanges were not frequent and they did not involve all projects. Overall, the seven research teams reported 66 exchanges over the 18-month period from January 2015 to July 2016, with a minimum of two and a maximum of 19 for each team. The two research teams in Kenyan and Bangladesh who had a somewhat similar focus on eHealth policy and governance exchanged information frequently either directly or using the SharePoint site. Two other teams also used SharePoint relatively frequently to communicate with others. The remaining three teams remained inactive within the peer-to-peer SEARCH network.

We analyzed the self-reported network interactions excluding IDRC, the gender consultant team and our own evaluation team to obtain a picture of cross-grant learning and communication within SEARCH beyond the usual background of technical and administrative communications in an IDRC grant program. The methodology for the network analysis is described in Annex 2. The profile of the network is illustrated in Figure 3.

Figure 3: Cross-grant SEARCH network



The proximity of the symbols indicates the number of exchanges between projects, the opacity of the connecting line indicates the self-reported usefulness of the exchange. The figure shows that the teams in Bangladesh and Kenya had frequent direct contact, as well as contact with others via the SharePoint site. The teams in Burkina Faso and Viet Nam used the SharePoint site more frequently than the teams in Lebanon, Peru and Ethiopia, however the total number of exchanges via SharePoint was low (31 exchanges), and the difference is therefore not very large. Of course, the site may have been accessed more frequently, but the statistics for individual sign-ins could not be generated by the IDRC IT team.

Network data and the results of the network analysis are presented in greater detail in Annex 2. In summary, the expectations for cross-project learning beyond the traditional mode of IDRC mediated

exchanges and organized workshops were only partially realized. The main reason mentioned in interviews was the diversity of projects within the SEARCH program. The theme of eHealth and health systems research opened several fields that were thematically too different to overcome the geographic spread and language barriers among the seven projects. That this type of networking can be successful when the research focus is more specific was demonstrated by the exchanges between the project teams in Kenya and Bangladesh.

Defining the program theme more specifically is one way to stimulate networking and to build a critical mass of researchers. Other ways, as demonstrated by other successful IDRC-supported networking programs, are to limit the geographic scale and to support an institution to act as a networking hub. An example is the IDRC-supported Regional Network on Equity in Health in East and Southern Africa (EQUINET).[2]

Limiting the geographic scale also creates more opportunities for physical meetings of the research teams. In interviews and in the on-line surveys at baseline and at follow-up, the SEARCH teams underlined the importance of these meetings for the stimulation of networking and inter-project dialogues. The expectation that the dialogue that was started among projects at the Cape Town SEARCH workshop would continue at the same level via remote communications was overly optimistic. A limited number of opportunities for face-to-face exchanges were realized in international conferences, but, as one team pointed out, there were also some missed opportunities, for instance the 2015 International Health Conference in Montreal.

4.6 Self-assessed project outcomes

In addition to the five evaluation questions, we asked the project team leaders for an assessment of their success in reaching the project objectives. At the time of the interviews, the projects were at different stages of implementation and completion. While some projects were confident that they had met their goals, others thought they were on the right path. Based on their objectives, the projects used a variety of metrics to measure success. These included: (i) specific health outcomes e.g. number of antenatal care visits or number of people with HIV lost to follow-up, (ii) outcomes of knowledge translation e.g. mHealth acceptability, interactions with decision-makers, policy document production and (iii) thematic outcomes e.g. governance, data quality, gender issues.

Constraints and aspects of the projects that did not work out as planned included:

- The project in Viet Nam did not succeed in attracting graduate students to work with the project
- The team in Peru mentioned that gender analysis was given low priority by government and therefore not implemented as planned
- The Kenya team found that innovators in eHealth were reluctant to share information about their technology
- Technical issues such as poor internet connectivity of health facilities and poor electricity supply to charge cell phones in the community were cited by the teams in Ethiopia and Burkina Faso
- In Bangladesh, political issues prevented some stakeholders from participating in the project

Feedback from beneficiaries (patients, health workers and government bodies) was mostly positive and in most instances was used to improve the projects. One project reported that it was too early to assess impact among beneficiaries. The others noted positive changes: (i) government adoption of the project, (ii) more community empowerment, (iii) better understanding of mHealth technologies among community members and (iv) adoption of their research product (an ICT framework) as a teaching tool in academic institutions.

[2] http://www.equinetafrica.org/

All teams thought the projects were worth the money spent, but they did cite some efficiency challenges related to delays caused, for instance, by political problems limiting stakeholder involvement, lengthy software development processes, or delays in securing political commitment. Some projects already had assurances of scale-up by the government, others felt a formal cost-effectiveness analysis would be required to convince government to adopt and scale up their piloted intervention, while some of them had ongoing discussions with government and were optimistic about the potential for scale-up. Although none had secured additional funding to continue their research, at least three were actively looking for more funding.

5 CONCLUSIONS

5.1 Lessons learned

Lesson 1: The research field circumscribed by the objective of the SEARCH program (eHealth, health systems, and equity) is very large. For a relatively small research program such as SEARCH, a more narrowly defined research area may have a greater chance of generating a critical level of results at the program level with a potential of greater impact.

While each of the seven projects funded under the SEARCH program will, without doubt, contribute lessons on the integration of ICT in health systems, the focus of this evaluation is on the program level. According to the SEARCH call for concept notes, the overarching objective of the grants is to '*support research on how and when eHealth can influence the functioning of health systems to improve health outcomes, and ultimately to contribute toward reducing health inequities'*. [IDRC 2012] Each project has, in its own way, met this objective. The question of the evaluation, however, is whether there are lessons that can be drawn across all projects in terms of common implementation challenges and generalizable results, and in terms of the way projects implemented on three continents can work together to create a critical level of knowledge to potentiate the impact of these results.

Mobile phones, tablets, computers, local area networks, the internet and social networks are tools that are used millions of times every day in the administration and delivery of health services. They are firm fixtures in health systems, but there is limited knowledge of when and how their use improves health outcomes and even less about their effect on the equity of health services. When trying to categorize the changes brought about by ICT in health, it soon becomes clear that they occur on many different levels in the health system.

- There are changes in the way health information is transmitted and received with effect on health seeking behaviour and on the accountability of health service providers to their clients
- There are changes in the way medical records are generated, stored and linked to health management information systems, increasing the management capacity of these systems for the provision of services for individual care and for population health
- There are changes in the way health service providers receive and share information with the potential of improving the accuracy of diagnosis, the effectiveness of referrals, and the quality of services

These changes have equity and justice dimensions; social and gender equity related to differential access to technology based on gender and wealth; global economic equity based on the differential resources available to national health systems to adopt technological innovations in their health management information system; gender and rural-urban equity related to information support to providers of health care, and the effect of this support on their status and work load.

The SEARCH projects were studying all these dimensions, sometimes well circumscribed like the project in Peru which focused primarily on improving care through a better integrated medical record and health management information system, sometimes covering two dimensions like the project in Lebanon that combined the study of demand-side and supply-side effects of eHealth. In addition, two of the seven projects approached the issue from the policy perspective, examining potential analytic and regulatory frameworks to understand and improve the safety, economy and equity of the use of ICT in health systems.

These two projects in the SEARCH program illustrate, that when there is congruence of scope and objectives, research projects will find ways to work together and exchange information across continents. The lesson to be drawn from this is that for a small research program such as SEARCH (only seven projects), a more narrowly defined research field may have a greater chance of generating a critical level of research results with a potential of greater impact at the program level. Research fields, for instance, can be limited to the use of mobile phones for health promotion and demand generation; the impact of the expansion of IT in the health sector on human resources, or on the quality of services; or the governance of eHealth within the overall health systems governance structures and processes.

Lesson 2: Research teams in the SEARCH program had a lot of interest and capacity to further develop and implement the principles of equity, governance and systems integration that framed the SEARCH program. However, unless there is a specific effort to support this process, as for the consultant support in gender research, this interest is marginalized and the capacity remains underutilized.

The 'effective principles' of the former IDRC GEHS program, 'equity, governance and systems integration' were taken up by the SEARCH program and in the terms of reference of the program evaluation. The three principles were presented and discussed at the program development workshop in 2013. At the time, it became clear that the short-listed grant applicants had different interpretations and placed different emphases on these principles, and that there was interest to continue exploring these concepts.

In 2014, IDRC commissioned a survey among the funded research teams to further explore the common understanding of the three principles and to initiate a cross-grant learning process. The assessment focused on the principle of 'systems integration' and found that there was no single accepted definition. The consultants recommended that the research teams should consider developing a *'conceptual framework for systems integration as this will prompt the researchers to reflect further about the potential impact of their projects on the wider health system and how systems integration could be maximized.'* [Abdel Aziz & Nigenda 2014]

As the on-line surveys and interviews during the evaluation period document, the understanding of the concepts among the research teams did evolve gradually. The feedback on the consultant support for gender analysis documented that equity research took a great leap forward. Several studies and initiatives were started to examine the impact of eHealth on gender equality. The findings of the consultants who worked with the research team was that the research teams had a lot of capacity to conduct gender analysis, however, that it was largely underutilized.

The lesson to be drawn from these findings are that, within a network of independent research projects, core programmatic concepts are not necessarily a main preoccupation of individual research teams who, understandably, focus their attention on the implementation of their own research objectives. However, when opportunities are created to further develop and implement programmatic concepts and principles, they are readily taken up and existing capacities are mobilized with new energy.

Lesson 3: The SEARCH program confirmed in a convincing manner that the IDRC grants-plus approach contributes significantly to IDRC's success in its global role as a funder of research development in low and and middle-income countries.

There was unanimous agreement among all research teams that the technical support provided by IDRC program officers contributed greatly to the quality of the research. Some teams listed IDRC as the main reference for external quality assurance. Several researchers also commented on the difference of working with IDRC funding and funding from other sources. The technical support provided by IDRC is unparalleled and highly appreciated.

This support is standardized in IDRC's *modus operandi* and generally referred to as the 'grants-plus' approach. Under this model, the research support provided by IDRC *'goes well beyond making financial contributions… The Centre also places great emphasis on engaging with its partners in their research and policy priorities, helping to open spaces for their views and perspectives, including critical ones. It also provides intellectual leadership in a spirit of mutual learning.'* [IDRC 2009]

In implementing the grants-plus approach, IDRC automatically becomes a hub in the program network of researchers. The frequent exchanges of IDRC program officers with the research teams, including site visits and reviews of interim progress reports, provide opportunities to communicate experiences and transfer lessons from one team to another. The evaluation findings indicate that this type of hub and spoke networking was considerably more active than networking in the more random pattern through direct contacts between projects initiated by the research teams themselves.

While the role of IDRC as a network hub is limited to the duration of the program, the grants-plus approach has proven itself in the SEARCH program as a highly functional contributor to research quality and research capacity development and as one factor of IDRC's global success as a funder of research development in low and middle income countries.

Lesson 4: The SEARCH program united seven research teams working in the relatively new field of the interface of ICT and health systems. Stimulating networking in this field is important, but it is also more difficult than networking in other research areas that have standardized methodologies and approaches. This requires resources that were not foreseen in the development of the SEARCH program. The level of networking and the results of network exchanges did therefore not live up to expectations.

Although each of the seven research teams contributed to the achievement of more than one of the six expected outcomes of the SEARCH program (see Section 1), the expectations that these achievements would be enhanced through networking among the teams were only partially met. There are several reasons, one of which was the wide range of differing research themes discussed under the first lesson. Other reasons were mentioned repeatedly in interviews and on-line surveys by the research teams, some of which were already signalled at the first SEARCH workshop in 2014:

- The assumption that SEARCH grantees would be particularly active users of electronic remote communications technologies because they are researching eHealth issues was likely too naïve. The SEARCH teams faced the same constraints of electronic networking as all other researchers in global networks with three working languages spanning 12 time zones.

- Although the teams, or at least the lead members of each team, met twice in workshops in Vancouver and in Cape Town, they continued to signal that more frequent physical meetings would be required in order to move forward on the networking initiatives that were started at these meetings. This is again related to the broad scope of the program. While projects with similar objectives and approaches managed very well in supporting each other via remote communication in solving implementation issues, the discussion of health system principles and concepts is much more difficult to keep alive over great distances.

- Networks, even those that are meant to emerge naturally among organizations with common interests, usually require a hub and an animator to keep them vibrant and alive. The hub technology that was chosen by IDRC because of resource constraints, a Microsoft SharePoint site on the IDRC server, is not designed for this purpose. SharePoint is a technology that allows the members of an organization or corporation to work together on their common agenda or business. The research teams, however, are independent entities that require a more accessible and responsive platform to exchange information. Furthermore, this platform requires a manager and animator. Successful IDRC-supported networks generally have an institution that takes charge of this task, either with its own resources or with funding provided by IDRC. There was an implicit expectation for the evaluation team to take this role, but this was neither resourced, nor was it clear how this role would agree with the evaluation mandate.

The lesson to be drawn from these findings is that building networks, especially around a research area that is not well established such as the research of the interface between IT and health systems, does not happen automatically but requires resources. It requires physical meetings at greater frequency to work through underlying principles and concepts; it requires a responsive and easily accessible hub for the sharing of ideas, and it requires an animator who keeps the network alive and continues to stimulate contributions by the network members.

5.2 Recommendations

Recommendation 1

Although there is a plethora of research initiatives and pilot projects on eHealth, research on the interface of eHealth and health systems is a new field that does not receive much attention. This applies especially to research on how the introduction of ICT affects the equity of health service provision in low and middle-income countries at the supply and the demand side. The projects funded under the SEARCH program document that there are still many questions to be answered, and we therefore recommend that IDRC continue to support research in this area.

Recommendation 2

Future initiatives or programs by IDRC in support of research on the integration of eHealth in health systems should focus more narrowly, thematically and possibly also regionally, to increase the potential for the development of a critical level of research initiatives and institutions that will generate new knowledge about health systems structures and practices. For example, a clear distinction could be made between the broader subject of eHealth and the more narrowly defined issues of mHealth, the use of mobile phone technology in health care delivery. Likewise, distinctions could be made between research on the use of ICT in health promotion and its effect on the demand side of health services, and research on ICT for training and quality control, or for increasing the efficiency of medical records management and health management information systems. Finally, the issue of how eHealth affects the standards, regulations and policies of health systems governance is another field with many open questions that require further research.

Recommendation 3

Framing a research program by defining core principles such as the former GEHS principles of equity, governance and systems integration provides guidance to the funded projects and contributes to giving the program a sharper profile. However, none of these principles are self-explanatory and they are not necessarily central among the objectives pursued by the individual research teams. Any future program should therefore establish a process to support a continuous dialogue to link the principles to project implementation and outputs.

Recommendation 4

The SEARCH program has documented convincingly that the IDRC grants-plus approach has a central role in assuring the quality of funded research and in the development of research skills and capacity. Although this approach, as outlined in the 2010-2015 Strategic Framework of IDRC, is no longer mentioned in the 2015-2020 Strategic Plan, it is a distinguishing mark of IDRC research development funding that should not be weakened.

Recommendation 5

Stimulating the emergence of research networks for mutual support and greater impact in new research areas such as the interface of eHealth and health systems is an important and worthwhile effort. However, it should be adequately resourced, including the provision of resources for more frequent physical meetings, a well adapted virtual networking platform, and possibly also by funding of an organization to act as network convener and animator.

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ANNEX

Annex 1: Early research outputs provided to the evaluation team

Bangladesh

Das S, *et al*. Constructing a conceptual framework to address accountability and equity considerations within eHealth initiatives in Bangladesh. *Conference Abstract*

Rasheed S, *et al*. What is the current status of Information, Communication Technology (ICT)-based health interventions in Bangladesh? *Conference Poster*

Das S, *et al*. What is the current status of Information Communication Technology (ICT) based health and nutrition interventions in Bangladesh? *Conference Poster*

Rasheed S. E and mHealth to bridge health systems gaps. *Slide Set for Conference Presentation*

Burkina Faso

Sanou H, *et al*. Leçons apprises du processus de construction de la plateforme technologique mobile-santé communautaire dans le District Sanitaire de Nouna, Burkina Faso. *Journal Abstract*

Yé M, *et al*. Contribution du téléphone mobile à l'accès équitable aux soins de santé maternelle, infantile et des personnes vivantes avec le VIH au Burkina Faso. *Conference Abstract*

Yé M, *et al*. Use of mobile phone to promote governance and equity within the health system: Experience of rural health district in Burkina Faso. *Slide Set for Conference Presentation*

Yé M, *et al*. (2016) Use of Mobile Phone to Promote Governance and Equity within the Health System: Experience of Rural Health District in Burkina Faso. *Journal of Healthcare Communications*; 1(3):1-11

Yé M, *et al*. Qualité perçue des soins reçus par les PVVIH dans le District Sanitaire de Nouna. *Paper submitted for publication*

Sanou H, *et al*. Notes sur le processus de mise en place d'une plateforme de santé mobile: design, défis et perspectives à venir. *Paper submitted for publication*

Peru

Pérez-Lu JE, *et al*. (2015) Reduciendo las inequidades en salud y mejorando la salud materna mediante la mejora de los sistemas de información en salud: Wawared Perú. *Rev Peru Med Exp Salud Publica*;32(2):373-7.

Viet Nam

Nguyen L. Building maternal e-health in Vietnam. Asia Research News. *News flash*

Nguyen L, *et al*. Improving maternal and perinatal care for ethnic minorities in Thai Nguyen, Vietnam through an integrated eHealth and user-provider interaction mode. *Conference Abstract*

Nguyen L, *et al*. Improving maternal and perinatal care for ethnic minorities in Thai Nguyen, Vietnam through an integrated eHealth and user-provider interaction mode. *Conference Poster*

Annex 2: Network analysis

Glossary of terms

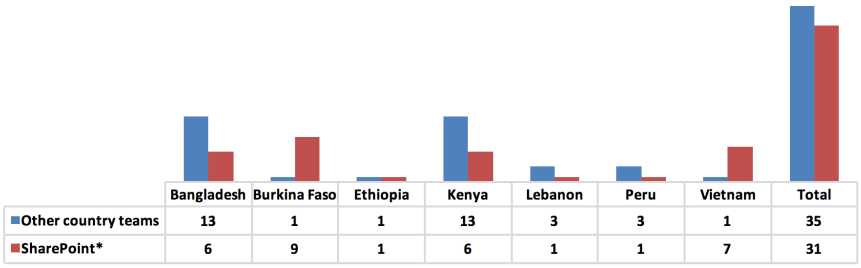
Term	Meaning	Example
Network	The relationship that exists between actors. It can also be called a partnership, a collaboration, alliance or group.	The SEARCH network
Actors	Network members that are distinct individuals, collective units or entities	Research teams and the SharePoint site
Network metrics		
Network density	A measure of how many exchanges occurred in the network divided by the total number of exchanges that could exist if every actor had some interaction with every other actor. It is a proportion, ranging from 0 (no interactions occurred) to 1 (every actor interacted with every other actor).	The density of the SEARCH network was 0.61, meaning that only about two thirds of all possible interactions occurred.
Maximum geodesic distance	The largest number of exchanges required to interact with any other individual. Stronger networks have a lower maximum geodesic distance. It can also be referred to as the diameter of the network. The more interaction there is between actors, the smaller the maximum geodesic distance.	In the SEARCH network, the maximum geodesic distance was 2, meaning that for any actor to reach another they only had to interact with one central actor who will interact with all the others. In this case the SharePoint site
Average geodesic distance	The average distance between actors, where geodesic distance is the distance between two actors along the shortest path between them. It is the total distance between all pairs divided by the total number of interactions. The more interaction there is between actors, the smaller the average geodesic distance.	In the SEARCH network, the average geodesic distance was 1.22, indicating that the SharePoint site did not have an important role in mediating the interactions between individual actors.
Actor metrics		
Degree* centrality	The degree centrality of an actor is a count of the number of actors that are connected to it.	For example, the Bangladesh team had interacted with six other actors directly, while the Burkina Faso team had only interacted with two (the Peru team and the SharePoint site)
Betweenness centrality	The betweenness centrality of an actor is a metric of how many times he acts as a bridge along the shortest path between two other actors. The more actors an actor bridges, the higher his betweenness centrality	The SharePoint site has the highest betweeness centrality, while the Ethiopia team, for instance never acted as a bridge and therefore has a centrality of zero.
Closeness centrality	This is the inverse of the sum of the distance between an actor and all other actors. The more central an actor is the lower its total distance from other actors, the higher its betweenness centrality.	For example, the SharePoint site has the highest closeness centrality value followed by Bangladesh and Viet Nam.

*All centrality metrics measure the influence or importance of an actor in a network

Summary of responses

The research teams reported a minimum of two exchanges and a maximum of 19. For a total of 66 exchanges, 35 were with other country teams and 31 with the SharePoint site (logging on to access information or posting information). The figure illustrates the number of exchanges from January 2015 to July 2016.

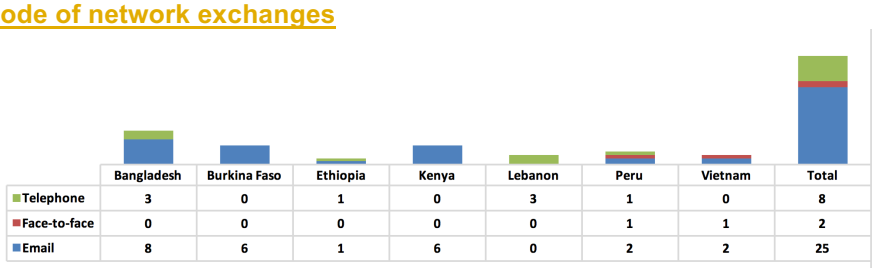
Number of network exchanges



	Bangladesh	Burkina Faso	Ethiopia	Kenya	Lebanon	Peru	Vietnam	Total
Other country teams	13	1	1	13	3	3	1	35
SharePoint*	6	9	1	6	1	1	7	31

The main mode of communication was email (25), followed by telephone calls (8) and face-to-face interactions (2). The Vietnam team visited the Peru team once at an international conference held in Peru. The figure illustrates the mode of exchanges between January 2015 and July 2016.

Mode of network exchanges



	Bangladesh	Burkina Faso	Ethiopia	Kenya	Lebanon	Peru	Vietnam	Total
Telephone	3	0	1	0	3	1	0	8
Face-to-face	0	0	0	0	0	1	1	2
Email	8	6	1	6	0	2	2	25

When asked to rank the usefulness of exchanges, interactions with country teams were ranked higher than interactions with the SharePoint site. The SharePoint site was ranked even lower than after the first six months of the program.

Perceived usefulness of network exchanges

Period	Jan-Jun 2015	Jul 2015-Jun 2016
Networking with:	Median (Low; High)	Median (Low; high)
Other teams	6 (0;6.5)	6 (1;7)
SharePoint	5 (2; 6.5)	2 (2;6)

The main content of exchanges was announcement of papers accepted for presentation in international conferences or for publication. Project related issues such as implementation issues were also discussed between country teams working on similar projects.

In one project, interactions with other SEARCH teams led to a revision of the project framework. Shared experiences led to a deeper understanding of important gender considerations in eHealth. For the most part interactions with other SEARCH teams did not bring about changes.

Almost all the respondent felt that there was insufficient communication among the SEARCH teams. Only one team was satisfied with the amount of exchanges they had.

The main reasons given why exchanges did not happen was because SEARCH teams were busy with their own projects; some SEARCH teams were unresponsive to outreach and changes in SEARCH team management hampered communication.

Network appraisal

The SEARCH network is a multipartite network comprising different types of actors with different roles. The SEARCH research teams represent ‘expert nodes’; and the SharePoint site is considered a

'contact node'. The exchanges are considered to be undirected because of the complexity of the interactions. With multiple emails and phone calls, information and knowledge goes in both directions and therefore we deemed it inappropriate to allocate directions to the exchanges. The exchanges were valued, based on the usefulness participants allocated to them. These data pertain to the sum total of exchanges that occurred over 18 months. This is a static picture of an inherently dynamic network, but we did not observe major fluctuations over time. The network analysis is limited only to networking within the SEARCH program. Interactions with researchers or institutions outside of the program are not included in the analysis.

The total number of actors was 8 (7 SEARCH teams plus the SharePoint site), with 66 exchanges of which 6 were unique (multiple email exchanges between two actors counted as one exchange). Only postings to the SharePoint and self reported accesses were counted in this analysis as we did not have access to data on individual logins. The network density - a measure of how many exchanges occurred in the network divided by the total number of exchanges that could exist if every actor had some interaction with every other actor - was 0.607. The maximum geodesic distance - largest number of exchanges required to interact with any other individual – was 2. The average geodesic distance – the average number of connections required to connect with everyone in the network - was 1.218

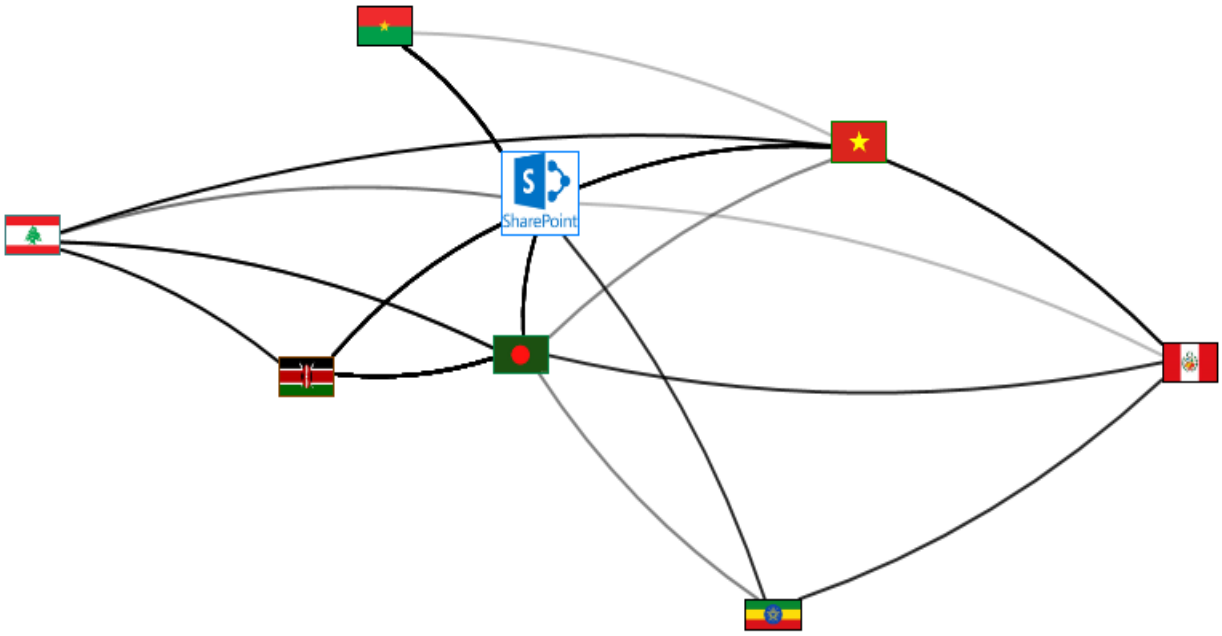
The SharePoint site played a central role and can be seen with the degrees of centrality, where degree centrality is the number of connections a node has to other nodes, betweenness centrality is a measure of the extent to which a node is connected to other nodes that are not connected to each other, and closeness centrality is a measure of the degree to which an individual is near all other individuals in the network.

Actors	Degree Centrality	Betweenness Centrality	Closeness Centrality
Peru	4	0.333	0.100
Vietnam	5	1.833	0.111
SharePoint	7	6.000	0.143
Kenya	3	0.000	0.091
Bangladesh	6	2.500	0.125
Lebanon	4	0.333	0.100
Burkina Faso	2	0.000	0.083
Ethiopia	3	0.000	0.091

Visualisation

The network interactions are presented visually with the use of the Fruchterman-Reingold algorithm (Fruchterman & Reingold, 1991). Each research team is represented by the flag of their country, while the other actors are represented by their respective logos. The actors with the most exchanges are located in the centre of the graph, while those with fewer exchanges are found on the periphery. The distance between actors indicates how many exchanges they had (more exchanges equals shorter distance), for example Kenya and Bangladesh had many interactions. The opacity of the links between actors indicates how useful the interaction was (darker equals more useful).

The SEARCH Network



Interpretation and key messages:

- The SharePoint site played a central role in the network
- Exchange was mostly by email
- The topics of exchange were often related to research outputs from the SEARCH teams or implementation issues
- Exchanges with other teams rarely led to changes in projects but were perceived to be more useful than interactions with the SharePoint site
- Country teams agreed that more interaction would have been better
- Lack of common ground for discussion and unresponsiveness of some teams hampered communication
- One mediator would have been sufficient to link the teams together. The SharePoint site did not play the mediator role as the interactions with SharePoint were not actively moderated.
- Only 60% of all possible interactions occurred.

Conclusions:

Interactions in the SEARCH network occurred sparingly, often driven by the need to share research output and discuss implementations issues. These interactions were limited by the different levels of completion of the various projects, the diversity of the topics covered and the passive nature of the key communication hub- the SharePoint site. As such, interactions between the teams, though perceived as necessary and useful, did not bring about much change in the way projects were conducted. More homogeneity in the topics covered and a moderated central communications hub may have resulted in more fruitful exchanges between teams.

Annex 3: Analysis of on-line survey data

Respondents Profile

Country Team	Baseline	Follow-up
Bangladesh	2	3
Burkina Faso	8	3
Ethiopia	3	3
Kenya	3	2
Lebanon	1	4
Peru	3	1
Viet Nam	0	5

Team Position	Baseline	Follow-up
PI or Co-PI	6	11
Researcher / Staff	14	10
Sex		
Female	5	9
Male	15	12

Likert Scales: (2=Strongly Agree, 1=Agree, 0=Neutral, -1=Disagree, -2=Strongly Disagree)

Statement	Responses	+2	+1	0	-1	-2	Mean
Core Concepts							
The introduction of information and communication technology in health systems can contribute to making the systems more equitable	Baseline (n=20)	13	5	1	0	1	**1.45**
	Follow-up (n=21)	9	10	1	0	1	**1.24**
The research findings of our project will / did contribute to making the national and/or sub-national (e.g. district or zone level) health system more equitable	Baseline (n=20)	8	10	1	0	1	**1.20**
	Follow-up (n=21)	12	8	0	0	1	**1.43**
The introduction of information and communication technology can contribute to greater transparency and accountability in the governance of health systems	Baseline (n=20)	13	6	0	0	1	**1.50**
	Follow-up (n=21)	11	8	1	0	1	**1.33**
The research findings of our project will / did contribute to an increase in transparency and accountability in the governance of health systems	Baseline (n=20)	9	9	1	0	1	**1.25**
	Follow-up (n=21)	12	7	1	0	1	**1.38**
The introduction of information and communication technology can reduce the fragmentation of health systems	Baseline (n=20)	9	10	0	0	1	**1.30**
	Follow-up (n=21)	11	9	0	0	1	**1.38**
The research findings of our project will / have contribute(d) to improved governance and less fragmentation of the national and/or sub-national (e.g. district or zone level) health system	Baseline (n=20)	7	10	2	0	1	**1.10**
	Follow-up (n=21)	11	9	0	0	1	**1.38**
Social and Gender Analysis							
The expanded use of information and communication technology in health systems affects men and women differently	Baseline (n=18)	5	8	1	4	0	**0.78**
	Follow-up (n=19)	5	8	0	4	2	**0.53**
The expanded use of information and communication technology in health systems affects people in different social groups differently	Baseline (n=18)	8	6	2	1	1	**1.06**
	Follow-up (n=19)	6	8	0	4	1	**0.74**
Research on the use of information and communication technology in health systems must be based on a robust social and gender analysis.	Baseline (n=18)	12	5	1	0	0	**1.61**
	Follow-up (n=19)	11	5	1	0	2	**1.21**

Statement	Responses	+2	+1	0	-1	-2	Mean
In our research project, we will / did conduct a robust gender analysis allowing us to document the impact of information and communication technology on gender equality	Baseline (n=18)	6	8	4	0	0	**1.11**
	Follow-up (n=19)	7	8	2	1	1	**1.00**
In our research project, we will / did conduct a robust social analysis allowing us to document the effects of information and communication technology on social equity	Baseline (n=18)	4	13	1	0	0	**1.17**
	Follow-up (n=19)	6	11	1	1	0	**1.16**
Research Ethics							
Research on the use of information and communication technology in health systems raises ethical issues that require specific standards and guidelines to assure that research is ethical	Baseline (n=18)	10	7	1	0	0	**1.50**
	Follow-up (n=19)	5	12	2	0	0	**1.16**
The ethical standards for research on information and communication technology in health systems are well developed and available from reliable sources	Baseline (n=18)	2	7	5	2	0	**0.56**
	Follow-up (n=19)	3	5	9	2	0	**0.47**
The challenges of research ethics were well understood and fully taken into consideration when we started our research project	Baseline (n=18)	8	9	1	0	0	**1.39**
	Follow-up (n=19)	8	10	1	0	0	**1.37**
After starting our project, we faced unexpected ethical challenges that required modifications of the research protocol	Baseline (n=18)	0	2	2	11	3	**-0.83**
	Follow-up (n=19)	0	1	11	4	3	**-0.47**
Research Capacity (PIs and Co-PIs only)							
I have the skills to identify potential funding sources for health systems research	Baseline (n=5)	4	1	0	0	0	**1.80**
	Follow-up (n=10)	4	5	1	0	0	**1.30**
I have the skills to develop funding proposals for health systems research	Baseline (n=5)	5	0	0	0	0	**2.00**
	Follow-up (n=10)	7	3	0	0	0	**1.70**
I have the skills to collect and analyse qualitative data	Baseline (n=5)	3	2	0	0	0	**1.60**
	Follow-up (n=10)	9	1	0	0	0	**1.90**
I have the skills to apply gender and sex-based analysis in research	Baseline (n=5)	2	3	0	0	0	**1.40**
	Follow-up (n=10)	6	4	0	0	0	**1.60**
I have the skills to write up research findings for publications in scientific journals	Baseline (n=5)	2	3	0	0	0	**1.40**
	Follow-up (n=10)	8	2	0	0	0	**1.80**
Networking							
The facilities for cross-grant learning and the emphasis on networking among the teams in the SEARCH program are / were more intense than in other research projects in which I have participated	Baseline (n=19)	4	9	6	0	0	**0,89**
	Follow-up (n=19)	6	7	5	1	0	**0.95**
I intend to / I did engage regularly in exchanges of information and experiences with other research teams in the SEARCH program	Baseline (n=18)	6	10	2	0	0	**1.22**
	Follow-up (n=19)	2	7	8	1	1	**0.42**
Networking with other research teams in the SEARCH program will / did contribute significantly to the quality and success of our project	Baseline (n=19)	9	8	2	0	0	**1.37**
	Follow-up (n=19)	3	9	5	2	1	**0.58**

Statement	Responses	+2	+1	0	-1	-2	Mean
Networking with interested individuals, organizations and networks outside of SEARCH will / did contribute to outcomes that feed / fed back into SEARCH	Baseline (n=19)	8	10	1	0	0	**1.37**
	Follow-up (n=19)	0	13	6	0	0	**0.68**

Usefulness of different networking modalities: (-2=Not at all useful, -1=Not very useful, 0=neutral, +1=somewhat useful, +2=very useful)

Modality	Responses	-2	-1	0	+1	+2	Mean
SharePoint Site	Baseline (n=18)	0	0	2	8	8	**1.33**
	Follow-up (n=19)	0	2	6	9	2	**0.58**
E-mail and telephone exchanges with other projects	Baseline (n=19)	0	0	2	11	6	**1.21**
	Follow-up (n=18)	0	0	1	10	7	**1.33**
SEARCH Workshops	Baseline (n=17)	0	0	1	2	14	**1.76**
	Follow-up (n=17)	0	0	3	1	13	**1.59**

Intended use and final use of networking modalities: (0=Never, 1=Rarely, 2=Occasionally, 3=Moderate Amount, 4=Frequently)

Modality	Responses	0	1	2	3	4	Mean
SharePoint Site	Baseline (n=18)	2	2	3	6	5	**2.56**
	Follow-up (n=19)	1	8	4	5	1	**1.84**
E-mail and telephone exchanges with other projects	Baseline (n=19)	3	0	4	9	3	**2.47**
	Follow-up (n=19)	2	2	5	8	2	**2.32**
SEARCH Workshops	Baseline (n=19)	3	0	4	3	9	**2.79**
	Follow-up (n=19)	2	3	5	4	5	**2.37**

Narrative responses

Contribution of the research to increased equity in health systems?	Baseline	Follow-up
Health service quality and access (incl. for underserviced populations	12	13
Community building, community information, behaviour change	9	10
Better management of information	10	8
Better knowledge about inequities and underserviced populations	7	8
Improved systems, policies and governance (including equity issues)	2	10
Better use and better understanding of IT issues in health	10	1
Better resource allocation and cost reduction	4	5
Other	1	4
Total responses	**55**	**59**

Contribution of the research to improved health system governance?	Baseline	Follow-up
Greater transparency and more accountability	17	16
Community engagement, mobilisation, demand generation	9	12
ICT system development, information sharing	6	10
Improved service quality, availability and access	8	6
Improved health system efficiency and resource allocation	6	2
Improved health worker capacity	3	4
Better prioritization of health research	1	1
Other	4	4
Total responses	**54**	**55**